

10. The composition of Claim 8, containing 0.01% or less estradiol, 0.02% or less 2-hydroxyestradiol, 0.01% or less 4-hydroxyestradiol, 0.01% or less 4-methoxyestradiol, and 0.01% or less estrone.
- 5 11. The composition of Claim 8, wherein the 2-methoxyestradiol has a purity greater than 99.0%.
12. The composition of Claim 11, containing less than 0.01% estradiol and less than 0.01% estrone.
- 10 13. The composition of Claim 11, containing 0.01% or less estradiol, 0.02% or less 2-hydroxyestradiol, 0.01% or less 4-hydroxyestradiol, 0.01% or less 4-methoxyestradiol, and 0.01% or less estrone.
14. A method for purifying 2-methoxyestradiol to produce a 2-methoxyestradiol having a purity greater than 98% and containing less than 0.03% estradiol and less than 0.02% estrone comprising:
- 15 adding a solution comprising 2-methoxyestradiol to a chromatography medium; and
- eluting the 2-methoxyestradiol off of the medium with a solvent system comprising a polar solvent and a non-polar solvent.
- 20 15. The method of claim 14, wherein the medium is silica and wherein the 2-methoxyestradiol is eluted using a step gradient of 99:1 CHCl_3 :MeOH to 98:2 CHCl_3 :MeOH.
16. A method for producing 2-methoxyestradiol having a purity greater than 98% and containing less than 0.03% estradiol and less than 0.02% estrone comprising:

protecting the 3- and 17-hydroxyl groups of estradiol;

reacting the protected estradiol with bromine and acetic acid to produce a 2-brominated derivative of estradiol;

5 reacting the 2-brominated derivative of estradiol with sodium methoxide in the presence of a copper catalyst;

removing the protecting groups on the 3- and 17-hydroxyl groups to produce 2-methoxyestradiol; and

10 purifying the 2-methoxyestradiol using liquid chromatography on an adsorption/partition medium with a solvent system comprising a polar and a nonpolar solvent.

17. A method for producing 2- methoxyestradiol having a purity greater than 98% and containing less than 0.03% estradiol and less than 0.02% estrone comprising:

15 ring-brominating estradiol by reacting estradiol with bromine in the presence of acetic acid to produce a ring-brominated intermediate;

reacting the ring-brominated intermediate with sodium methoxide in the present of a copper catalyst to produce 2-methoxyestradiol; and

20 purifying the 2-methoxyestradiol using liquid chromatography on an adsorption/partition medium with a solvent system comprising a polar and a nonpolar solvent.

removing the protecting group on the 3-hydroxyl group to produce 2-methoxyestrone; and

reducing the 17-keto group of 2-methoxyestrone to produce 2-methoxyestradiol.

- 5 20. A method for producing 2- methoxyestradiol having a purity greater than 98% and containing less than 0.03% estradiol and less than 0.02% estrone comprising:

brominating estradiol in the presence of acetic acid to produce a mixture of ring-brominated estradiols;

10 isolating 2-bromoestradiol from the mixture of estradiols; and

reacting the 2-bromoestradiol with sodium methoxide in the presence of a copper catalyst to produce 2-methoxyestradiol.

- 15 21. 2-methoxyestradiol having a purity greater than 98% and containing less than 0.03% estradiol and less than 0.02% estrone produced by the process comprising:

protecting the 3- and 17-hydroxyl groups of estradiol;

reacting the protected estradiol with bromine and acetic acid to produce a 2-brominated derivative of estradiol;

reacting the 2-brominated derivative of estradiol with sodium methoxide in the presence of a copper catalyst;

removing the protecting groups on the 3- and 17-hydroxyl groups to produce 2-methoxyestradiol; and

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purifying the 2-methoxyestradiol using liquid chromatography on an adsorption/partition medium with a solvent system comprising a polar and a nonpolar solvent.

22. 2-methoxyestradiol having a purity greater than 98% and containing less than 0.03% estradiol and less than 0.02% estrone produced by the process comprising:

ring-brominating estradiol by reacting estradiol with bromine in the presence of acetic acid to produce a ring-brominated intermediate;

reacting the ring-brominated intermediate with sodium methoxide in the presence of a copper catalyst to produce 2-methoxyestradiol; and

purifying the 2-methoxyestradiol using liquid chromatography on an adsorption/partition medium with a solvent system comprising a polar and a nonpolar solvent.

23. 2-methoxyestradiol having a purity greater than 98% and containing less than 0.03% estradiol and less than 0.02% estrone produced by the process comprising:

protecting the 3- and 17-hydroxyl groups of estradiol;

reacting the protected estradiol with nitric acid and acetic acid to produce a 2-nitro derivative of estradiol;

reducing the 2-nitro derivative of estradiol to produce the corresponding 2-amino derivative of estradiol;

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brominating estradiol in the presence of acetic acid to produce a mixture of ring-brominated estradiols;

isolating 2-bromoestradiol from the mixture of estradiols; and

reacting the 2-bromoestradiol with sodium methoxide in the presence of a copper catalyst to produce 2-methoxyestradiol.

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